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**DIVISION of CONSUMER and TRANSPORTATION PROGRAMS**

**Background Document and Technical Support**  
**For Public Hearing**  
**On the Proposed Technical Revisions to 310 CMR 7.38,**  
**Certification of Tunnel Ventilation Systems**  
**In the Metropolitan Boston Air Pollution Control District**

Regulatory Authority  
M.G.L. c.111, Sections 142A through 142M

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## LIST OF ACRONYMS

CA/T	Central Artery/Tunnel
CAA	Clean Air Act
CEM	Continuous Emission Monitor
CFR	Code of Federal Regulations
CMP	Compliance Monitoring Program
CMR	Code of Massachusetts Regulations
CO	Carbon Monoxide
DEP	Massachusetts Department of Environmental Protection
DPW	Massachusetts Department of Public Works
EOEA	Executive Office of Environmental Affairs
EPA	United States Environmental Protection Agency
FR	Federal Register
FHWA	Federal Highway Administration
FSEIS/R	Final Supplemental Environmental Impact Statement/Report
MHD	Massachusetts Highway Department
MEPA	Massachusetts Environmental Policy Act
MTA	Massachusetts Turnpike Authority
NDIR	Non Dispersive Infrared
NMHC	Non Methane Hydrocarbons
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
NSR	New Source Review
PM <sub>10</sub>	Particulate Matter – ten micron size or less
PSD	Prevention of Significant Deterioration
SIP	State Implementation Plan
THC	Total Hydrocarbons
TWT	Ted Williams Tunnel
TSD	Technical Support Document

## **I. INTRODUCTION**

The Department of Environmental Protection (DEP) is proposing technical revisions to 310 CMR 7.38, Certification of Tunnel Ventilation Systems in the Metropolitan Boston Air Pollution Control District. The technical revisions apply to the emissions monitoring section of the regulation at 310 CMR 7.38(8)(a) and are a result of improved emissions monitoring techniques developed during early operating phases of the Central Artery/Tunnel Project (CA/T Project) and of the availability of more cost effective, longitudinal tunnel ventilation technology. In addition to the technical revisions, typographical errors are also being corrected in the existing regulation. After opportunity for public review and comment, the final changes will be adopted as an amended state regulation and submitted to the United States Environmental Protection Agency (EPA) as a revision to the Massachusetts State Implementation Plan (SIP).

## **II. BACKGROUND**

The Certification of Tunnel Ventilation Systems in the Metropolitan Air Pollution Control District regulation, 310 CMR 7.38, was promulgated on January 18, 1991 and applies to the construction and operation of any tunnel ventilation system for highway projects constructed after January 1, 1991. On October 8, 1992, EPA approved 310 CMR 7.38 as a revision to the Massachusetts SIP (57 FR 46310). In the final rule, EPA agreed with DEP that tunnel ventilation systems are not stationary sources subject to Prevention of Significant Deterioration (PSD) or to New Source Review (NSR) permitting requirements of the Clean Air Act (CAA), nor to DEP Plan Approval and Emissions Limitations Regulation for stationary sources, 310 CMR 7.02.

The purpose of the regulation is to require certification that tunnel ventilation systems for highway projects, including the CA/T Project, meet applicable air quality requirements, thereby protecting public health and the environment. The regulation requires an initial, “preconstruction” certification (CA/T Project obtained in 1991), an operation certification (required 12-15 months after a project becomes fully operational (the CA/T Project completion is projected mid 2005)), and re-certification every five years. In accordance with 310 CMR 7.38(2)(a) through (c), the proponent must certify that the project will not:

- a) Cause or exacerbate a violation of any National Ambient Air Quality Standard as set forth at 40 CFR 50, or a Massachusetts Ambient Air Quality Standard as set forth at 310 CMR 6.00; or
- b) Cause or exacerbate a violation of the Department’s one hour ambient NO<sub>2</sub> guideline of 320 ug/m<sup>3</sup>; or
- c) Result in an actual or projected increase in the total amount of non-methane hydrocarbons measured within the project area when compared with the no-build alternative.

### III. PROPOSED TECHNICAL REVISIONS

Subsection (8)(a) of the regulation currently requires installation of continuous emissions monitors and recorders that comply with EPA performance and siting requirements, specified at 40 CFR Part 60, Appendix B. DEP has determined that this specific continuous monitoring requirement should be revised as explained later in this document. A summary of the proposed technical revisions is as follows:

Delete the following wording from 310 CMR 7.38(8)(a):

- (a) Emissions monitoring. Any person who constructs and operates a tunnel ventilation system which is subject to the requirements of 310 CMR 7.38 shall, prior to commencing operation of the tunnel ventilation system or operating the project roadway for public use, install continuous emission monitors and recorders which shall continuously monitor the air contaminants listed in the Department's acceptance of the certification. Said monitors and recorders shall comply with EPA's performance and siting requirements set forth in 40 CFR Part 60, Appendix B. Equipment specifications, calibration and operating procedures for such monitors and recorders shall be submitted to the Department demonstrating such compliance.

Insert the following wording into 310 CMR 7.38(8)(a):

- (a) Emissions Monitoring. Any person who constructs and operates a tunnel ventilation system which is subject to the requirements of 310 CMR 7.38 shall, prior to commencing operation of the tunnel ventilation system or opening the project roadway for public use, develop and submit to the Department for review and approval an "Air Emissions Monitoring Protocol" and shall install and operate emissions monitoring and recording equipment in accordance with the approved protocol. Monitoring as approved by the Department shall be required at the exhaust stacks or exhaust plenums of ventilation buildings as well as at exit portals that utilize longitudinal ventilation. The Department will consider for approval hybrid monitoring systems that incorporate elements of 40 CFR Parts 58, 60, and 75 as much as practicable, as well as statistical analysis, computer modeling, and innovative technologies. The "Air Emissions Monitoring Protocol" may also be modified with prior written approval of the Department.

#### Typographical Errors:

- A) Correct typographical error in 310 CMR 7.38(2)(b) to indicate ug/m3 instead of mg/m3; and
- B) Correct typographical errors including, but not limited to, reference to 310 CMR 7.38(2)(a)1 through 3. instead of 310 CMR 7.38 (2)(a) through (c); and correct all recurring references to this subsection found throughout the regulation.

For a complete comparison of the text of the existing regulation to all of the proposed revisions, including subsection (8)(a) and the corrected typographical errors, a “redline and strikeout” version of the revised regulation is contained in Attachment B.

## **IV. NEED FOR THE REVISION**

### **Background**

In recent years, program-specific monitoring approaches have been developed for regional and federal programs such as the Ozone Transport Commission’s (OTC) NO<sub>x</sub> Budget Program, the federal Acid Rain Program, and the federal operating permit periodic monitoring requirements. Similarly, the CA/T Project-specific monitoring approaches have evolved, suggesting that a more flexible monitoring program is appropriate. There were two specific CA/T Project events since the regulation was first promulgated that triggered these proposed technical revisions to 310 CMR 7.38 (8): the addition of longitudinal ventilation and the Ted Williams Tunnel (TWT) monitoring program. This regulation will also apply to tunnel ventilation systems of future highway projects.

### **1. Addition of Longitudinal Ventilation**

During the late 1980s when the CA/T Project was initially planning and designing the ventilation system, the only FHWA authorized tunnel ventilation system was the traditional “full transverse ventilation.” When 310 CMR 7.38 was promulgated in 1991, it based the emissions monitoring requirement on full transverse ventilation technology.

In 1995, FHWA issued a memorandum titled “Mechanical Ventilation in Road Tunnels using Jet Fans” authorizing applicable projects, including the CA/T Project, to use longitudinal ventilation with jet fan technology. The availability of this additional ventilation technology was neither anticipated nor provided for in 310 CMR 7.38 (8). Following the FHWA authorization memo, the CA/T Project studied the supplementary use of longitudinal ventilation at several exit ramps as a cost saving measure. The CA/T Project subsequently filed a Notice of Project Change, underwent Massachusetts Environmental Policy Act (MEPA) review, and now employs longitudinal ventilation at eight exit ramps.

Though approved for use on the CA/T Project, the resulting emission impacts at the eight exit ramp portals cannot be monitored using CFR Part 60 Continuous Emissions Monitoring (CEM) methods because Part 60 is designed to measure emissions from stacks, not exit ramp portals.

### **2. The TWT Monitoring Program**

On December 15, 1995, the TWT opened to commercial and authorized traffic only. DEP notified the CA/T Project that the emissions monitoring requirements of the regulation applied to this restricted-use tunnel operation and required the CA/T Project to develop and begin an air monitoring program to measure the emissions from ventilation buildings six and seven, which

service the TWT. The CA/T Project then developed an emissions monitoring and data collection and reporting program, which was subsequently approved by DEP. In 1996, the CA/T Project began the emissions monitoring program, which was originally planned for five quarters. The monitoring program was extended to nine quarters at the request of DEP, and was refined and enhanced during this period. The monitoring program approved for this “early opening phase” lasted through December 1998. Data gathered during this monitoring program served two purposes. First it provided an indication of the emission levels from the two ventilation buildings during the “early opening phase.” Second, as required by 310 CMR 7.38 (8), it would be used to determine the appropriate scope of the required compliance monitoring program (CMP) for the CA/T Project’s eventual full operation. It should be noted that monitoring has continued since the specific “early opening phase” as required by 310 CMR 7.38 (8) and is being used to gather supplemental data to further refine the CMP.

Vent building six in South Boston serves a section of TWT including east and west-bound lanes and has six exhaust stacks linked to two ventilation zones. Vent building seven in East Boston serves a section of TWT including east and westbound lanes, Ramp T-AD, and has fourteen exhaust stacks linked to five ventilation zones. Of the seven ventilation zones, six cover both the east and westbound lane directions. DEP determined that monitoring at the exhaust plenums of these six ventilation zones instead of the twenty associated exhaust stacks housed in ventilation buildings six and seven would enable a more efficient and cost effective capture of all ventilation building emissions for TWT without compromising the results.

The pollutants measured were Carbon Monoxide (CO), Nitric Oxide (NO), Nitrogen Oxides (NO<sub>x</sub>), Particulate Matter – ten micron size or less (PM<sub>10</sub>), and Total Hydrocarbons (THC) in lieu of Non Methane Hydrocarbons (NMHC). The monitoring program ran two weeks per quarter during which CO, NO, NO<sub>x</sub> and THC were continuously measured at each ventilation building plenum. In addition, integrated 24-hour average PM<sub>10</sub> samples were collected at each of these plenums. Traffic monitoring (vehicle count, vehicle classification, and vehicle speed) was also collected during this period.

Based on the monitoring program completed in 1998, DEP and the CA/T Project determined that there were more practical alternatives to monitoring in strict accordance with 40 CFR Part 60. For example, while 310 CMR 7.38(2)(c) requires a tunnel ventilation system, project roadway or roadway network (including the CA/T) to “not result in an actual or projected increase in the total amount of” NMHC, no monitor actually exists to measure NMHC; instead, THC emissions are the chemical substances typically measured. In attempting to measure THC, the monitored concentrations of THC were found to be low, leading to “operational difficulties regarding system calibration and maintenance due to low concentration measurements” (see page 33 in “Ted Williams Tunnel Emissions Monitoring Data Collection Program and Proposed Project-Wide Compliance Monitoring Program - Final Report - Revision 1,” April 2000)<sup>1</sup>. Based on these issues, DEP has devised an innovative approach of using continuously monitored traffic data as a surrogate for NMHC.

Similarly, based on the results of continuous CO, NO and NO<sub>x</sub> monitoring in the TWT, the CA/T Project proposed a statistical approach to explore the possibility of using continuously

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<sup>1</sup> This report and other reference documents are available upon request.

monitored CO emission levels as a surrogate to predict NO and NO<sub>x</sub> concentrations. The results of a correlation analysis indicate a moderate to strong correlation between CO and NO and CO and NO<sub>x</sub>. This correlation analysis was based on data sets representing different seasons, ventilation zones, and direction of traffic. Pollutant monitoring data collected since this “early opening phase” continues to support the CO/NO<sub>x</sub> relationship and a statistical approach to determining NO<sub>x</sub> emissions based on measured CO concentrations.

Although 310 CMR 7.38(8)(a) requires the use of monitoring procedures found in EPA’s 40 CFR Part 60, DEP found that broadening the scope to include other federal monitoring procedures improved the monitoring program completed in 1998. The monitoring program measured all pollutants (except for THC) using reference or equivalent methodologies specified in 40 CFR Part 58 ambient air monitoring, and also included the most appropriate elements from various established monitoring programs including 40 CFR Part 60, 40 CFR Part 75 and periodic monitoring. The 40 CFR Part 58 reference or equivalent method provides specification-based and performance based (precision and accuracy) assessment. The 40 CFR Part 60 methods stress initial and periodic performance testing. The 40 CFR Part 75 methods require the measurement of monitoring system bias. The use of these combined monitoring techniques resulted in a hybrid-monitoring program that included elements of both ambient air quality monitoring and continuous emission monitoring, not strictly limited to 40 CFR Part 60.

Therefore, DEP is proposing to allow use of monitoring approaches other than 40 CFR Part 60. Elements of 40 CFR Parts 58 and 75 will be used, as well as statistical analysis, computer modeling, and appropriate technologies. These proposed monitoring approaches will apply to the CA/T Project and will also apply to future highway projects with tunnel ventilation systems.

### **3. Future Monitoring Improvements**

DEP is also proposing to revise the emissions monitoring requirements at 310 CMR 7.38 (8)(a) to allow flexibility so that as technological advances occur in contaminant and emissions monitoring, DEP will be able to modify monitoring procedures without necessarily having to complete a regulatory revision process. Therefore, the proposed regulation would allow affected projects to periodically modify or update their air emission monitoring protocol with written approval of DEP.

### **Conclusion**

When completed, the CA/T Project will operate a full transverse ventilation system consisting of six individual vent buildings, serving twenty-two ventilation zones and housing seventy-three individual stacks. In addition, longitudinal ventilation will be used on eight exit ramps.

The years of experience gained from the monitoring program developed since the early opening phase of the TWT, as well as the need to meet the unique monitoring requirements of longitudinal ventilation, has afforded DEP and the CA/T Project the opportunity to develop and assess more appropriate monitoring methods than those allowed by the traditional 40 CFR Part 60 CEM methods as required by 310 CMR 7.38. These proposed monitoring approaches will



apply to the CA/T Project and will also apply to future highway projects with tunnel ventilation systems.

Therefore, DEP has determined that the exclusive use of the traditional 40 CFR Part 60 CEM methods as required by 310 CMR 7.38 is neither technically feasible nor desirable for the types and concentrations of pollutants subject to the required CMP upon completion of any project subject to this regulation, including the CA/T Project.

To ensure that the revised monitoring requirements remain appropriate and effective, the proposed revisions to 310 CMR 7.38 require any project subject to this regulation, including the CA/T Project to develop an updated Air Emissions Monitoring Protocol, which fully describes the applied monitoring methodologies for the proposed system and the method by which any proposed changes to the methodologies must be reviewed and approved by DEP.

## **V. AGRICULTURAL IMPACTS**

Massachusetts General Laws, Chapter 30A, Section 18, requires state agencies to evaluate the impact of programs on agriculture within the Commonwealth. DEP has determined that the proposed technical revisions to 310 CMR 7.38 will not have any negative impacts on agriculture in Massachusetts.

## **VI. AIR QUALITY IMPACTS**

The proposed technical revisions to 310 CMR 7.38 modify the regulation's emissions monitoring requirements. The result of these modifications is improved monitoring techniques that are appropriate for any project subject to this regulation including the CA/T Project. The revisions will not affect the emissions from said projects.

## **VII. IMPACTS ON MASSACHUSETTS MUNICIPALITIES, PROPOSITION 2 ½**

The proposed technical revisions to 310 CMR 7.38 are designed to allow greater flexibility and anticipated lower cost in implementing the monitoring provisions of 310 CMR 7.38(8)(a). At this time there is no municipally owned facility subject to 310 CMR 7.38. Therefore, there are no impacts to municipalities under Proposition 2 ½.

## **VIII. MASSACHUSETTS ENVIRONMENTAL POLICY ACT**

This proposed technical revisions are "categorically exempt" from the "Regulations Governing the Preparation of Environmental Impact Reports," 301 CMR 11.00, because the proposed revisions to the regulation will result in improved methodologies for monitoring project emissions and will not effect the actual generation of emissions. Nevertheless, these proposed revisions are consistent with the original January 2, 1991 FSEIR Certificate for the CA/T Project which required periodic assessment of air quality monitoring procedures.

## **IX. IMPACTS ON OTHER PROGRAMS**

Modification of 310 CMR 7.38 will not have any direct impacts on other programs. There is the possibility of indirect effects on other programs dealing with transportation issues, in that failure of the CA/T Project's measured pollutant emissions to remain below established emission limits contained in the operating certificate could result in the requirement to implement additional transportation related mitigation measures beyond those already linked to the CA/T Project, but this could occur whether or not these technical changes are made to 310 CMR 7.38.

## **X. PUBLIC PARTICIPATION**

The proposed technical revisions are subject to public review and comment prior to finalization and promulgation. After public review, and DEP evaluation and response to comments, the final regulation will be submitted to EPA as a revision to the Massachusetts SIP for ozone.

As required by state law, DEP gives notice and provides the public the opportunity to review background and technical information at least 21 days prior to proposing amendments at a public hearing. To assure more adequate notice for processing an amendment to the SIP and comply with EPA notice requirements, a formal notice is being issued 30 days before the public hearing. The public hearing to collect comments on the proposed SIP revisions will be conducted under the provisions of M.G.L Chapter 30A on:

July 19, 2005 in the Atlantic Conference Room on the 2<sup>nd</sup> floor at the DEP Office at  
One Winter Street, Boston, MA 02108

Testimony may be presented orally or in writing at the public hearing. Written comments will be accepted until 5pm on July 29, 2005. Please submit comments to:

Commonwealth of Massachusetts  
Department of Environmental Protection  
Bureau of Waste Protection  
Division of Consumer and Transportation Programs  
One Winter Street, 10<sup>th</sup> Floor  
Boston, MA 02108

Attn: Jerome Grafe

Comments sent to other DEP offices may not be received in time to be included in the official docket. If there are any questions regarding this document, or related materials please contact Jerome Grafe at (617) 292-5708 or email [Jerome.Grafe@state.ma.us](mailto:Jerome.Grafe@state.ma.us)

## ATTACHMENT A:

### List of References

These documents are available for review upon request of DEP.

- January 2, 1991, “Certificate of the Secretary of Environmental Affairs on the Final Supplemental Environmental Impact Report” relative to the Central Artery/Third Harbor Tunnel project; EOE number 4325.
- January 18, 1991, promulgation of regulation 310 CMR 7.38 “Certification of Tunnel Ventilation Systems in the Metropolitan Boston Air Pollution Control District.”
- February 20, 1991, Massachusetts Department of Public Works “Technical Support Document, Preconstruction Certification of the Tunnel Ventilation System for the Central Artery/Tunnel Project.”
- May 10, 1991, Federal Highway Administration “Record of Decision, Central Artery (I-93)/Tunnel (I-90) Project, Supplemental Environmental Impact Statement Boston, Massachusetts” FHWA-MA-EIS-82-02-FS2.
- May 10, 1991, “Memorandum of Understanding for Air Quality During Construction for the Central Artery/Third Harbor Tunnel Project” signed by representatives from DEP, DPW, FHWA, and the EPA.
- July 8, 1991, DEP letter giving “Conditional Acceptance of Preconstruction Certification of the Central Artery/Third Harbor Tunnel Project.”
- October 8, 1992, EPA published Final Rule 40 CFR Part 52 (57 FR 46310-46312) titled “Approval and Promulgation of Air Quality Plans; Massachusetts’ (Amendment to Massachusetts’ SIP, for Ozone and for Carbon Monoxide, for the Control of Air Pollution by Certifying Roadway Tunnel Ventilation Systems in the Metropolitan Boston Air Pollution Control District).”
- August 22, 1995, MHD report titled “Draft Methodology for Assessing Use of Jet Fan Ventilation for Design Contract DO19E.”
- November 1, 1995, FHWA memorandum titled “Mechanical Ventilation in Road Tunnels using Jet Fans.”
- February 7, 1996, letter from DEP to MHD which notified MHD that an “early opening phase” air monitoring program would be required for the CA/THT Project.
- February 26, 1996, letter from MHD to DEP agreeing to an “early opening phase” air monitoring program.

- August 13, 1996, letter from DEP to MHD which notified MHD that exit portals utilizing “longitudinal” ventilation are subject to 310 CMR 7.38 and an emissions monitoring program would need to be developed for these portal locations.
- October 10, 1996, MHD submittal to EOE, report titled “Implementation of Longitudinal Ventilation Notice of Project Change for the Central Artery/Tunnel Project (Project) in the area North of Causeway Street and the Central Area.”
- December 5, 1996, DEP letter to MHD acknowledging receipt of the “Vehicle Emissions Monitoring Plan for the Early Opening Phase of the Ted Williams Tunnel, Revision 1” and the DEP approval of this monitoring plan.
- April 1, 1999, MTA submittal to DEP of document titled “Ted Williams Tunnel Emissions Monitoring Data Collection Program and Proposed Project-Wide Compliance Monitoring Program – Final Draft Report” dated March 31, 1999.
- September 17, 1999, DEP letter to MTA providing consolidated review comments on the March 31, 1999 “final Draft Report” mentioned above.
- February 9, 2000, MTA submittal to DEP of document titled “Ted Williams Tunnel Emissions Monitoring Data Collection Program and Proposed Project-Wide Compliance Monitoring Program – Final Report” dated February, 2000.
- April 13, 2000, MTA submittal to DEP of document titled “Ted Williams Tunnel Emissions Monitoring Data Collection Program and Proposed Project-Wide Compliance Monitoring Program – Final Report – Revision 1” dated April, 2000.
- June 15, 2001, DEP letter concurring with MTA’s proposal to use CAT-100 Gas Analyzers to monitor CO at all 6 ventilation buildings and 8 longitudinally ventilated exit ramps.
- October 17, 2001, DEP determination that test results of the Rosemount CAT-100 Gas Analyzer meets certification test specifications.
- April 16, 2002, DEP acceptance of MTA’s proposed procedures to evaluate ventilation system CO, NO<sub>2</sub>/NO<sub>x</sub>, and PM emissions for compliance with Operating Certification requirements, and DEP determination that a single consolidated certification should be filed by MTA at completion of the full project.
- July 30, 2002, DEP acceptance of MTA’s proposed procedures to evaluate ventilation system NMHC emissions for compliance with Operating Certification requirements.
- March 10, 2003, DEP tentative approval to allow MTA to use Mobile 6 with local specific inputs and actual traffic count specification data from TWT, to define the CO/NO<sub>x</sub> ratio subject to MTA’s agreement to obtain an additional year of in-tunnel CO/NO<sub>x</sub> monitoring and preparation of TM assessing and comparing the results of Mobile 6 vs. TWT monitoring data.

- March 8, 2004, in conjunction with DEP's July 30, 2002 correspondence, this letter approves the approach to be used by the CA/T Project to determine NMHC compliance with DEP regulation 310 CMR 7.38.

1-27-05